Dina Mistry

Network Scientist · Infectious Disease Modeler · Complex Systems Researcher

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Summary

Computational researcher with an interdisciplinary background in network science, infectious disease epidemiology, and physics. 8 years of experience modeling complex systems, contagion phenomena, and data driven models of diverse human contact networks. My interests lie in developing frameworks and tools for data driven research in public health to deliver real world impact and centered on equity and open science practices.

Education

Northeastern University — *Boston, MA*

Ph.D. in Physics — *01/2014 - 01/2019*

Dissertation: The Heterogeneous Nature of Contagion Processes in Complex Networks

Advisor: Dr. Alessandro Vespignani, Network Science Institute Director and Sternberg Family Distinguished Professor

Northeastern University — *Boston, MA*

M.Sc. in Physics — *09/2012 - 01/2014*

University of Toronto — *Toronto, Canada*

Hon. B.Sc. in Physics & Astronomy, Minor in Mathematics with High Distinction — *09/2007 - 05/2012*

Undergraduate Thesis: The Axisymmetric Geometry of Saturn's Magnetic Fields

Advisor: Dr. Sabine Stanley, Bloomberg Distinguished Professor

Experience

Twitter — *1355 Market Street, Suite 900 San Francisco, CA 94103*

Data Scientist II

Content Data Science — *06/01/2021 - PRESENT*

- Lead data scientist working on Identities & Profiles
- Collaborating in cross functional teams with Product Strategy, Engineering, Trust & Safety, and Data Science
- Delivering data-driven insights to shape user facing platform changes with network science and causal inference research
- Building data quality frameworks, data pipelines, and analytical models using Python and the Google Cloud Platform
- Designing dashboards in Data Studio for reporting and tracking of KPIs
- Creating strategies in cross functional teams to improve transparency and help Twitter users understand who they see online
- Designing large scale online experiments to elevate credible information on breaking news from experts and trusted sources on Twitter
- Developed an experimentation playbook to train cross functional partners in online experimentation, hypothesis testing, and statistical analysis

Institute for Disease Modeling, at the Bill & Melinda Gates Foundation (formerly part of Intellectual Ventures) — *500 5th Avenue, Seattle, WA 98109; (3150 139th Avenue SE, Bellevue, WA 98005)*

Postdoctoral Research Scientist

Network Epidemiology and Behavior — *07/13/2020 - 05/31/2021 (02/04/2019-07/13/2020)*

- Collaborating to model strategies and tradeoffs for school reopening in Washington state and global settings during the COVID-19 pandemic
- Presenting analysis and modeling methodologies developed as part of the COVID-19 research team at online international conferences
- Engaging with public health partners and stakeholders to design population and network model development
- Lead the research, design, and development of an open-source Python library, SynthPops, to generate diverse data-driven human contact networks for public health research
- Co-authored academic publications and executive reports on COVID-19 transmission dynamics and evaluation of mitigation strategies
- Modeling the role of social trust and the long standing effects of memory of disease risk in acceptance of health (mis)information
- Collaborating in cross functional teams to develop open source tools for public health research

Northeastern University

177 Huntington Avenue,
Boston, MA, 02115

Graduate Researcher, MOBS Lab, Network Science Institute

Synthetic Contact Networks *10/15/2015 - 01/23/2019*

- Developed adaptive algorithms to generate synthetic human contact networks using public data sources for diverse populations
- Modeling infectious disease spreading in data-driven synthetic contact networks
- Implemented Markov chain Monte Carlo (MCMC) and other computational methods to infer epidemiological parameters and validate with serological data
- Built and maintained a database of age mixing contact matrices for 300+ global locations
- Supervised junior graduate students

H1N1 Pandemic Scenario Analysis *01/04/2015 - 01/23/2019*

- Characterized the predictability of global epidemic spreading patterns across multiple pandemic scenarios from in-silico micro-simulations
- Visualization of stochastic micro-simulations of different pandemic scenarios
- Analyzed commercial airline mobility network data using statistical mechanics, network science, and information theoretic measures

Spreading of Zika virus in the Americas (www.zika-model.org) *01/03/2016 - 05/28/2017*

- Developed a stochastic data-driven vector-borne model of the 2016 Zika outbreak in real-time; collaborating with international research groups
- Aided in the streamlined analysis pipeline of simulation forecasts for time sensitive reports
- Collected, processed, and analyzed daily epidemiological case report data from 40 Pan-American countries for model calibration

Committed activists and the reshaping of status-quo social consensus *05/01/2013 - 10/22/2015*

- Developed agent based models of negotiation on conventions and opinion adoption in temporal social networks
- Explored campaign strategies to reduce the time and critical mass needed to drive populations towards consensus, as well as the hindering effects of community structures (echo chambers)
- Presented findings at the 2017 International School and Conference on Network Science

Publications

* Indicates equal contribution

Peer Reviewed

Modelling the impact of reopening schools in the UK in early 2021 in the presence of the alpha variant and with roll-out of vaccination against SARS-CoV-2
J.Panovska-Griffiths, R. M. Stuart, C. C. Kerr, K. Rosenfeld, **D. Mistry***, W. Waites, D. J. Klein, C. Bonell, R. M. Viner. 2022. *Accepted to J. Math. Anal.* https://www.medrxiv.org/content/10.1101/2020.09.02.20186742v1

Inferring high-resolution human mixing patterns for disease modeling.
D. Mistry, M. Litvinova, A. Pastore y Piontti, M. Chinazzi, L. Fumanelli, M. F. C. Gomes, S. A. Haque, Q. Liu, K. Mu, X. Xiong, M. E. Halloran, I. M. Longini, S. Merler, M. Ajelli, A. Vespignani. Nat. Commun. 12. 323. 2021. https://doi.org/10.1038/s41467-020-20544-y

Controlling SARS-CoV-2 via test-trace-quarantine.
C. C. Kerr, **D. Mistry***, R. M. Stuart*, K. Rosenfeld, G. R. Hart, P. Selvaraj, R. C. Núñez, J. A. Cohen, R. G. Abeysuriya, L. George, B. Hagedorn, M. Jastrzebski, M. Fagalde, J. Duchin, M. Famulare, and D. J. Klein. Nat. Commun. 12. 2993. 1-12. 2021.
https://doi.org/10.1038/s41467-021-23276-9

Covasim: an agent-based model of COVID-19 dynamics and interventions.
C. C. Kerr, R. M. Stuart*, **D. Mistry***, R. G. Abeysuriya, G. R. Hart, K. Rosenfeld, P. Selvaraj, R. C. Núñez, B. Hagedorn, L. George, A. Izzo, A. Palmer, D. Delport, C. Bennette, B. Wagner, S. Chang, J. A Cohen, J. Panovska-Griffiths, M. Jastrzebski, A. P. Oron, E. Wenger, M. Famulare, D. J. Klein. PLoS Comput. Biol. 17. 7. 2021. https://doi.org/10.1371/journal.pcbi.1009149

Estimating and mitigating the risk of COVID-19 epidemic rebound associated with reopening of international borders in Vietnam: a modelling study
Q. D. Pham, R. M. Stuart, T. V. Nyugen, Q. C. Luong, D. Q. Tran, T. Q. Pham, L. T. Phan, T. Q. Dang, D. N. Tran, H. T. Do, **D. Mistry**, D. J. Klein, R. G. Abeysuriya, A. P. Oron, and C. C. Kerr. Lancet Glob Health. 9. 7. 916-924. 2021. https://doi.org/10.1016/S2214-109X(21)00103-0

Role of masks, testing and contact tracing in preventing COVID-19 resurgences: a case study from New South Wales, Australia
R. M. Stuart, R. G. Abeysuriya, C. C. Kerr, **D. Mistry**, D. J. Klein, R. T. Gray, M. Hellard, N. Scott. BMJ Open 11. 4. e045941. 2021.
http://dx.doi.org/10.1136/bmjopen-2020-045941

Seeding COVID-19 across sub-Saharan Africa: an analysis of reported importation events across 40 countries.
L. A. Skrip, P. Selvaraj, B. Hagedorn, A. L. Ouédraogo, N. Noori, **D. Mistry**, J. Bedson, L. Hébert-Dufresne, S. V. Scarpino, B. M. Althouse. Am J Trop Med Hyg. 104. 5. 2021. https://doi.org/10.4269/ajtmh.20-1502

Modelling the potential impact of mask use in schools and society on COVID-19 control in the UK
J. Panovska-Griffiths, C. C. Kerr, W. Waites, R. M. Stuart, **D. Mistry**, D. Foster, D. J. Klein, R. M. Viner, C. Bonell. Sci. Rep. 11. 1. 2021. https://doi.org/10.1038/s41598-021-88075-0

Determining the optimal strategy for reopening schools, work and society in the UK: balancing earlier opening and the impact of test and trace strategies with the risk of occurrence of a secondary COVID-19 pandemic wave.
J. Panovska-Griffiths, C. C. Kerr, R. M. Stuart, **D. Mistry**, D. J. Klein, R. M. Viner, C. Bonell. Lancet Child Adolesc Health. 4. 11. 817-827. 2020. https://doi.org/10.1016/S2352-4642(20)30250-9

Modelling the impact of reducing control measures on the COVID-19 pandemic in a low transmission setting
N. Scott, A. Palmer, D. Delport, R. Abeysuriya, R. M. Stuart, C. C. Kerr, **D. Mistry**, D. J. Klein, R. Sacks-Davis, K. Heath, S. W. Hainsworth, A. Pedrana, M. Stoove, D. Wilson, M. E. Hellard. Med J Aust. Online2020 https://doi.org/10.5694/mja2.50845

Spread of infectious disease and social awareness as parasitic contagions on clustered networks.
L. Hébert-Dufresne, **D. Mistry**, B. M. Althouse. Phys. Rev. Res. 2. 3. 2020. https://link.aps.org/doi/10.1103/PhysRevResearch.2.033306

Quantifying the risk of Zika virus local transmission in the continental US during the 2015-2016 ZIKV epidemic.
K. Sun, Q. Zhang, A. Pastore-Piontti, M. Chinazzi, **D. Mistry**, N. E. Dean, D. P. Rojas, S. Merler, P. Poletti, L. Rossi, M. E. Halloran, I. M. Longini, A. Vespignani. BioMed Central Medicine. 16. 1. 195. 2018. https://doi.org/10.1186/s12916-018-1185-5

Spreading of Zika virus in the Americas.
Q. Zhang, K.Sun, M. Chinazzi, A. Pastore-Piontti, N. E. Dean, D. P. Rojas, S. Merler, **D. Mistry**, P. Poletti, L. Rossi, M. Bray, M. E. Halloran, I. M. Longini, A. Vespignani. Proceedings of the National Academy of Sciences. 114. 22. E4334-E4343. 2017. https://doi.org/10.1073/pnas.1620161114

Committed activists and the reshaping of status-quo social consensus.
D. Mistry, Q. Zhang, N. Perra, A. Baronchelli. Phys. Rev. E. 92. 042805. 2015. https:/doi.org/10.1103/PhysRevE.92.042805

In Preparation

SynthPops: A generative model of human contact networks.
D. Mistry, C. C. Kerr, M. Wu, M. Fisher, R. G. Abeysuriya, A. Thompson, L. A. Skrip, J. A. Cohen, B. M. Althouse, and D. J. Klein.

Reports & Preprints

Preventing a cluster from becoming a new wave in settings with zero community COVID-19 cases.
R. G. Abeysuriya, D. Delport, R. M. Stuart, R. Sacks-Davis, C. C. Kerr, **D. Mistry**, D. J. Klein, M. Hellard, and N. Scott. 2020. https://www.medrxiv.org/content/medrxiv/early/2020/12/22/2020.12.21.20248595.full.pdf

Determining the optimal strategy for reopening schools, work and society in the UK: balancing earlier opening and the impact of test and trace strategies with the risk of occurrence of a secondary COVID-19 pandemic wave
J.Panovska-Griffiths, C. C. Kerr, R. M. Stuart, **D. Mistry***, D. J. Klein, R. M. Viner, C. Bonell. 2020. https://www.medrxiv.org/content/10.1101/2020.06.01.20100461v1

Stepping Back to School: A step-by-step look at COVID introduction, spread, and exportation
D. J. Klein., C. C. Kerr, **D. Mistry**, E. Wenger, J. A. Cohen. 2021. Report on Infohub

Testing the waters: is it time to go back to school?
D. J. Klein., C. C. Kerr, **D. Mistry**, N. Thakker, J. A. Cohen. 2020. Report on Infohub

Schools are not islands: Balancing COVID-19 risk and educational benefits using structural and temporal countermeasures
J. A. Cohen, **D. Mistry**, C. C. Kerr, and D. J. Klein. 2020. https://www.medrxiv.org/content/10.1101/2020.09.08.20190942v1

Maximizing education while minimizing covid risk: priorities and pitfalls for reopening schools
J. A. Cohen, **D. Mistry**, C. C. Kerr, D. J. Klein, M. Izzo, J. Schripsema. 2020. Report on Infohub

Schools are not islands: we must mitigate community transmission to reopen schools.
J. A. Cohen, **D. Mistry**, C. C. Kerr, M. Famulare, D. J. Klein, M. Izzo, J. Schripsema. 2020. Report on Infohub

Modeling countermeasures for a balanced reopening in King County, Washington.
K. Rosenfeld, C. C. Kerr, J. Cohen, R. Núñez, G. Hart, **D. Mistry**, P. Selvaraj, and D. J. Klein. 2020. Report on InfoHub

COVID-19 trends in Oregon: Preparing for opening up
C. C. Kerr, K. Rosenfeld, B. Hagedorn, **D. Mistry**, and D. J. Klein. 2020. https://pamplinmedia.com/documents/artdocs/00003672290550-0825.pdf

Working paper: Projected COVID-19 epidemic trends and health system needs for Oregon.
C. C. Kerr, B. Hagedorn, **D. Mistry**, and D. J. Klein. 2020. Report on Infohub

Presentations

Invited Talks

NSF PREPARE Workshop: Social, Behavioral, Economic and Governance — *Virtual*
Networks all around: Social contact patterns and what they can tell us about COVID-19 control and interventions — *06/25/2021*

University of Copenhagen — *Virtual*
Guest Lecturer in Mathematical Modeling in Epidemiology Graduate Course — *05/31/2021*

Center for Statistics and Quantitative Infectious Diseases, Fred Hutch Cancer Research Center & University of Florida — *Virtual*
Network Epidemiology & COVID-19 — *05/05/2021*

University of Notre Dame — *Virtual*
Guest Speaker in Infectious Disease Epidemiology and Ecology Graduate Course — *03/05/2021*

COVID Modeling Panel, National Institute of Statistical Sciences — *Virtual*
Covasim: An Open Source Agent-Based Model of COVID-19 Transmission and Control — *12/16/2020*

Modelling the spread and impact of COVID-19, Graz Schumpeter Centre — *Virtual*
Covasim: An Open Source Agent-Based Model of COVID-19 Transmission and Control — *12/10/2020*

Women in Network Science Seminar, University of Washington — *Virtual*
Network Epidemiology and COVID-19
Recording: https://youtu.be/d00J7t5akPU — *12/09/2020*

Data and Methods Brown Bag, University of Washington — *Virtual*
SynthPops: Social Contact Network Modeling for the COVID-19 Pandemic — *11/18/2020*

Institute for Pure and Applied Mathematics (IPAM) — *Virtual*
Panelist, Mathematical Models in Understanding COVID-19: Science Communication — *08/13/2020*

Network Science for Social Good (NetSci 2019) — *Burlington, VT*
Diversify NetSci — *05/27/2019*

Data Science and Methods 573, University of Washington — *Seattle, WA*
Guest Lecturer on Network Science — *02/28/2019*

Humanyze — *Palo Alto, CA*
Exploring the effects of complex networks on contagion phenomena — *09/03/2018*

Conference on Complex Systems — *Cancun, Mexico*
The influence of cultural and societal diversity on epidemic spreading — *09/19/2017*

Contributed Talks

Networks 2021 — *Virtual*
The longstanding effects of disease awareness, memory, and social trust on infectious disease spreading in multigenerational networks — *07/07/2021*

Networks 2021 — *Virtual*
SynthPops: A Generative Model of Human Contact Networks — *07/05/2021*

International School and Conference on Network Science (NetSci 2020) — *(Virtual) Rome, Italy*
Diversity, Equity, & Inclusion in Network Science and Society — *09/19/2020*

International School and Conference on Network Science (NetSci 2019) — *Burlington, VT*
Inferring high-resolution disease specific human mixing patterns — *05/29/2019*

3MinuteThesis, GWISE, Snell Library, Northeastern University — *Boston, MA*
Data-driven approaches to infectious disease modeling and the role of human interaction networks — *10/16/2018*

International Conference on Complex Networks — *Boston, MA*
A data-driven approach to infer social contact networks in the context of infectious disease modeling — *03/05/2018*

Grad Research Panel, Snell Library, Northeastern University — *Boston, MA*
Data-driven approaches to stochastic infectious disease modeling — *02/28/2018*

International School and Conference on Network Science (NetSci 2017) — *Indianapolis, IN*
Committed activists and the reshaping of status-quo social consensus — *06/22/2017*

Poster Presentations

Epidemics — *Charleston, SC*
The longstanding effects of disease awareness and social memory on infectious transmission in networks — *12/04/2019*

Research, Innovation, and Scholarship Expo, Northeastern University — *Boston, MA*
Using data-driven models to infer social contact patterns in the context of epidemics — *04/07/2016*

Professional Service & Leadership

Conferences, Panels, Institutes, and Workshops

2021	**Parallel Session Chair**, Networks 2021	*(Online)*
2021	**Poster Adjudicator**, Networks 2021	*(Online)*
2020	**Panel Moderator: Decolonizing Global Health**, IDM Diversity, Equity, & Inclusion Committee	*(Online) Seattle, WA*
2020	**Co-Organizer & Reviewer**, NetSci 2020 Financial Support Committee	*(Online) Rome, Italy*
2020	**Panel Moderator: Diversifying Network Science**, 2nd Annual Diversify Netsci, NetSci 2020	*(Online) Rome, Italy*
2020	**Co-Chair**, 2nd Annual Diversify Netsci, NetSci 2020	*(Online) Rome, Italy*
2020	**Parallel Session Chair**, NetSci 2020	*(Online) Rome, Italy*
2020	**Program Committee**, NetSci 2020	*(Online) Rome, Italy*
2020	**Program Committee**, NetSci-X 2020 Winter Conference	*Tokyo, Japan*
2019	**Co-Chair**, Inaugural Diversify NetSci, NetSci 2019	*Burlington, VT*
2018	**Program Committee**, International Conference on Complex Networks	*Boston, MA*
2018	**Art of Networks local organizer**, International Conference on Complex Networks	*Boston, MA*
2018	**Paper Unwind Co-Organizer: Society of Young Network Scientists (SYNS)**, International Conference on Complex Networks	*Boston, MA*

Professional Societies

2019-2021	**Chair**, Society for Young Network Scientists (SYNS)	*International*
2018	**Women's Summer Retreat Organizer**, GWISE (Graduate Women in Science and Engineering)	*Cambridge, MA*

Peer Review

2022	**Manuscript Reviewer**, International Journal of Environmental Research and Public Health
2021	**Manuscript Reviewer**, Nature Human Behavior
2021	**Manuscript Reviewer**, Journal of Theoretical Biology
2021	**Manuscript Reviewer**, Bulletin of Mathematical Biology
2020	**Manuscript Reviewer**, Royal Society Open Science
2020-2021	**Manuscript Reviewer**, Nature Communications
2020	**Manuscript Reviewer**, Communications Physics
2019-2021	**Manuscript Reviewer**, PLOS Computational Biology
2019	**Manuscript Reviewer**, Chaos AIP
2017-2021	**Manuscript Reviewer**, PLOS ONE

Departmental Service

2018	**Senior Grad Panel, Graduate School & Research**, Dept. of Physics, Northeastern University	*Boston, MA*
2017	**Panel member, Diversity and Inclusion Town Hall**, College of Science, Northeastern University	*Boston, MA*
2017	**Professional Development Workshop Organizer**, Dept. of Physics, Northeastern University	*Boston, MA*
2016-2018	**Graduate Student Union Dept. Leader**, Dept. of Physics, Northeastern University	*Boston, MA*
2014-2016	**Physics Graduate Student Representative**, Northeastern University	*Boston, MA*
2012	**Transit of Venus Outreach Science Volunteer**, Dept. of Astronomy & Astrophysics	*Toronto, Canada*
2011-2012	**Vice President of Academic Affairs**, Physics & Astronomy Student Union, University of Toronto	*Toronto, Canada*

Teaching

2014	**Physics Lab Instructor**, U.S. Pathway Program (USPP), a summer bridge program for international students from China and Nigeria	*Northeastern University*
2012-2014	**Physics Lab Instructor**, Introductory Physics Labs (16 sections), Department of Physics	*Northeastern University*
2013-2014	**Physics Workshop Leader**, (6 sections) Department of Physics	*Northeastern University*
2012	**Interactive Learning Sessions Teaching Assistant**, Department of Physics	*Northeastern University*
2011	**AST201H1 Teaching Assistant**, Department of Astronomy & Astrophysics	*University of Toronto*

Advanced Schools & Workshops

The World Bank *Online*

Invited lecturer for the Zimbabwe COVID-19 Modeling Workshop *11/15/2021 - 11/17/2021*

Lectured sessions on:

- Populations and network modeling in epidemiology
- Data visualization in Python

Vermont University *Burlington, VT*

Invited participant to the Workshop on Invasion in Ecological Networks *08/25/2019 - 08/31/2019*

Université Laval *Quebec City, Canada*

Participant in the 1st Complex Networks Winter Workshop *12/15/2018 - 12/22/2018*

University of Washington *Seattle, WA*

Attended the 7th Annual Summer Institute in Statistics and Modeling in Infectious Diseases *07/05/2015 - 07/22/2015*

Certificates obtained in the modules:

- Probability and Statistical Inference
- Stochastic Epidemic Models with Inference
- Simulation-based Inference for Epidemiological Dynamics
- MCMC I & II for Infectious Diseases

Awards & Honors

2015	**Summer Institute in Statistics and Modeling in Infectious Diseases Scholarship**, 7th Annual Summer Institute	*University of Washington*
2012-2014	**Graduate Teaching Assistantship Award**, Department of Physics	*Northeastern University*
2012	**Anna & Alex Beverly Memorial Fellowship**, for future graduate studies	*University of Toronto*
2012	**Marie Sklodowska-Curie Association Undergraduate Scholarship**, for academic excellence in Physics	*University of Toronto*
2011	**Undergraduate Summer Research Award**, Highly competitive research assistantship award. Conducted experiments to study the nonlinear growth of stalactites. *Advisor: Prof. Stephen Morris.*	*University of Toronto*
2008-2012	**Dean's List of Scholars**, Faculty of Arts & Science	*University of Toronto*
2008	**C. L. Burton Scholarship for Mathematics and Physics**, Faculty of Arts & Science	*University of Toronto*
2007	**Top Scholar's Scholarship**, Faculty of Arts & Science	*University of Toronto*
2007	**President's Entrance Scholarship**, Faculty of Arts & Science	*University of Toronto*

Software

Open Source Software

Lead Developer
SynthPops: Python, PyPI | http://synthpops.org/ *03/09/2020 - Present*

Contributor
Covasim: Python, PyPI | https://covasim.org *03/15/2020 - Present*

Skills & Expertise

Programming Python C++, SQL , Google BigQuery , Presto
Visualization Matplotlib, d3, Gephi, Data Studio, Photoshop, Illustrator
Software LaTeX, Git, Unix/Linux, MacOS

Media Coverage

Research tips thousands of COVID deaths without restrictions and more vaccinations The Age

Schools could open if rest of lockdown stays, say researchers BBC News

What coronavirus modelling released by the Victorian Government says about schools and Melbourne's roadmap ABC News

Testing and tracing 'key to schools returning', scientists say BBC News

If COVID-19 doubles in the community, it doubles in schools, Seattle disease modeling group finds The Seattle Times

Mathematical models help predict the trajectory of the coronavirus outbreak. But can they be believed? The Seattle Times

Inslee issues emergency proclamation that limits large events to minimize public health risk during COVID-19. Gov. Jay Inslee, Medium

Diseases Spread Differently, Region by Region. This Mathematical Model Shows How. News@Northeastern

The Science That Spans MeToo, Memes, and Covid-19 WIRED

'Covid Near You' Crowdsources Data to Predict New Hot Spots WIRED

Projecting the spread of Zika The Atlantic, New Scientist, Homeland Security News Wire, WBUR Boston NPR's News Station

PhD Profile: Canis lupus Graduate Student Newsletter, Northeastern University